

2020 ACP Colorado Resident/Fellow Meeting

June 10, 2020

Denver, Colorado



RESIDENT ABSTRACTS

**PRESENTED:
JUNE 10, 2020**

Name: Cole Buchanan, MD

Presentation Type: Oral Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors: Eric Young, MD, Katarzyna Mastalerz, MD

Abstract Title: Using Resident Physician Stakeholder Input to Design and Implement Bedside Interdisciplinary Rounds at a Large VA Medical Center

Abstract Information:

Introduction: Bedside Interdisciplinary Rounds (IDR) are an effective means of improving communication, teamwork, and collaborative culture amongst physicians, nurses, and other healthcare providers in inpatient settings. In academic institutions, resident education is a priority for both housestaff and attending physicians. Little is known about housestaff perceptions of bedside IDR, and perceived impacts on resident education can be a barrier to implementation of bedside IDR in academic settings. This study sought to understand housestaff perceptions and preferences about bedside interprofessional rounding, and to use resident physician stakeholder input to develop and implement bedside IDR in a manner that maximizes the educational value of rounding.

Methods: 77 resident physicians in the University of Colorado Internal Medicine Training Program were surveyed to assess perceptions of bedside rounds, preferences regarding education on rounds, and preferences regarding the inclusion of interprofessional team members on rounds. Quantitative and qualitative data from this survey were analyzed and incorporated into the design of a bedside IDR structure that was subsequently introduced and implemented on academic internal medicine services at a large VA Medical Center in Aurora, CO in June 2019.

Results: Survey results showed that housestaff had generally positive perceptions of bedside rounds, valuing input from nursing, pharmacy, and discharge planners. Residents showed a strong preference for abbreviated bedside presentations, efficient rounding that did not exceed 2.5 hours, and education consisting of concise teaching pearls on rounds with supplemental education in the afternoons. Residents discussed that longer rounds and extensive teaching contributed to increased cognitive load and delayed patient care, with many essential tasks being pushed to the afternoon. Efficiency in daily workflow and elimination of redundancy were identified by residents as specific areas for improvement in the pre-existing rounding framework. These data were used as stakeholder input to design a bedside IDR structure that emphasized efficiency, interdisciplinary input, and concise teaching pearls in addition to its focus on the patient.

Conclusion: Resident stakeholder input is useful to the development and implementation of bedside IDR in academic institutions since residents are uniquely positioned to see the educational strengths and challenges of rounds. We used resident stakeholder input to develop and implement a bedside IDR structure that focused on enhancing resident education, decreasing cognitive load, and facilitating timely patient care. Future direction involves assessing whether the educational,

efficiency, and patient care goals of the implemented bedside IDR structure were met

Name: Cullen Buchanan, MD **Presentation Type:** Oral Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors:

Abstract Title: Acute Meningococcal Pericarditis Causing Cardiac Tamponade

Abstract Information:

Introduction: *Neisseria meningitidis* is a gram-negative diplococcus bacterium that can lead to serious infections such as meningitis. It is feared by clinicians for its ability to rapidly progress to septicemia and death. Although less common, but just as life-threatening, *Neisseria meningitidis* can lead to acute pericarditis and pericardial effusion causing cardiac tamponade.

Case Description: An 84-year-old male with past medical history of chronic obstructive pulmonary disease, hypertension, and moderate to severe aortic stenosis presented with acute onset malaise and fevers. The patient was septic with 2/2 blood cultures positive for *Neisseria meningitidis*. Intravenous ceftriaxone antibiotics were started. The patient demonstrated no signs or symptoms of meningitis, so lumbar puncture was not performed. Initial transthoracic echocardiogram showed an aortic valve that was thickened with restricted motion of the leaflets so vegetation could not be ruled out. Transesophageal echocardiogram 72 hours later showed no vegetation but a new moderate sized pericardial effusion. Patient developed atrial fibrillation with rapid ventricular response and was transferred to the cardiac intensive care unit and placed on amiodarone and heparin drips with conversion back to normal sinus rhythm. The patient subsequently developed positional chest discomfort and repeat transthoracic echocardiogram 48 hours later showed interval increase in the pericardial effusion. Bedside pulsus paradoxus was significant for tamponade physiology. There were no changes on electrocardiogram and no friction rub on auscultation. Emergent pericardiocentesis was performed and pericardial drain left in. Pericardial fluid gram stain and cultures remained negative. The pericardial drain was removed after 48 hours without re-accumulation of the effusion and the patient was discharged on a four-week regimen of ceftriaxone as well as colchicine and meloxicam for acute pericarditis.

Discussion: Acute pericarditis is an inflammatory process of the pericardium which classically manifests with sharp positional chest pain and a friction rub. The inflammatory process is frequently associated with development of a pericardial effusion. The development of acute pericarditis and rapidly accumulating pericardial effusion is life-threatening and should not be missed in a patient with a rapidly changing clinical course. Meningococcal pericarditis, as seen in this case, can be classified into three categories: a local manifestation of disseminated meningococcal disease, an immunoreactive pericarditis, and a primary meningococcal pericarditis. The immunoreactive pericarditis is a hypersensitivity reaction that produces a sterile inflammation of the pericardium and typically responds to anti-inflammatory agents. Given that the patient's pericardial effusion was gram stain and culture negative, the

presumptive diagnosis was made. He was treated with antibiotics for his bacteremia and a course of colchicine and meloxicam for his acute pericarditis. This case highlights the importance of a broad differential diagnosis and integration of clinical knowledge with bedside physical exam maneuvers to diagnose and treat a rapidly progressive complication of meningococcal infection.

Name: Cassandra Duarte, MD

Presentation Type: Oral Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors: Nieves Martinez Chanza, MD, Katharine Collier, MD, Nazli Dizman, MD, Nityam Rathi, Rana R. McKay, MD, Justine Panian, Vivek Narayan, MD, MS, Benedito A. Carneiro, MD, MS, Anthony E. Mega, MD, Junxiao Hu, PhD, Cheryl Meguid, DNP, Neeraj Agarwal, MD, Sumanta K. Pal, MD, Amir Mortazavi, MD, Lauren C Harshman, MD, Elaine Tat Lam, MD

Abstract Title: Outcomes of Patients with Pancreatic-Only Oligometastatic Renal Cell Carcinoma (RCC)

Abstract Information:

Background: Patients (pts) with RCC and oligometastatic pancreas metastases are treated with pancreatectomy, stereotactic body radiation therapy (SBRT), or systemic therapy. The optimal approach is not clear. We aimed to evaluate the comparative efficacy of the modalities in terms of progression-free survival (PFS) and overall survival (OS).

Methods: This IRB-approved, multi-institutional, retrospective study evaluated pts with pancreatic-only RCC metastasis without concurrent metastases elsewhere. Data on pt demographics, tumor characteristics, treatment, and outcomes were collected. PFS and OS in pts treated with pancreatectomy vs. systemic therapy were compared by log rank tests.

Results: Fifty-one pts from 9 institutions were included. All had clear cell RCC; 50 pts had nephrectomy; 30 pts (58.8%) and 18 pts (35.3%) had IMDC favorable and intermediate risk, respectively. Median time from RCC diagnosis to oligometastatic disease was 120 months (mo) (range: 0, 175). As initial treatment, 23 (45%) pts had pancreatectomy (mostly partial); 25 (49%) had systemic therapy (VEGFR TKI and/or immunotherapy); 1 had SBRT; 2 had other treatments. Too few pts had SBRT for comparison. With a median follow-up of 25 mo (2, 68), median PFS for the population was 25 mo (17, 42 95% CI). Median PFS was 36 mo (8, 43 95% CI) for surgery pts and 22 mo (17, NR 95% CI) for systemic therapy pts; not statistically significant (NS), $p = 0.3$. Median OS for the population was 121 mo (100, NR 95% CI). With a median follow-up of 51 mo (2, 217), mOS was 121 mo (100, NR 95% CI) for surgery pts and not reached (64, NR 95% CI) for systemic therapy pts; NS, $p = 0.52$.

Conclusions: In this retrospective series, RCC pts with oligometastatic pancreatic-only disease had similar PFS and OS outcomes from initial pancreatectomy or systemic therapy. RCC pts with pancreas-only metastases represent a unique patient population and studies informing the underlying biology are needed to optimize clinical management.

Name: Jeff Ferrier, MD

Presentation Type: Oral Presentation

Residency Program: Sky Ridge Medical Center

Additional Authors: Andrea Kieffer, MD, Luke Proctor OMS-III, Jerrell Herod, MD, Dmitriy Scherbak, DO

Abstract Title: Recurrent Infective Endocarditis using Advanced Stereolithography to Elucidate the Etiology of Valvular Infection

Abstract Information:

Introduction:

Debate has raged for decades regarding prophylactic treatment of infective endocarditis (IE). Advances in imaging modalities and 3D-modeling provide opportunity for further explanation of the pathophysiology of IE, particularly the involvement by microbiological vegetations of both native and prosthetic valves. The efficiency and efficacy of 3D printed models of cardiac pathology is still in developmental stages. It is accepted that more detailed imaging can improve provider and patient understanding of the valvular pathology. Stereolithography techniques may lend to improved peri-operative and operative management when patients with IE require valvular repair. We hypothesize that stereolithography will be an improved imaging modality to prior techniques in terms of demonstrating valvular pathology and flow states.

Case Description:

We present a case of a 65 year old male with a congenital bicuspid aortic valve, patent foramen ovale, and history of subacute IE 2 years prior who presented with sepsis following a dental cleaning several weeks prior without prophylactic antibiotics. Blood cultures from his PCP revealed G+ cocci in chains found to be alpha hemolytic streptococci and he opted to receive six weeks of IV antibiotics for treatment of a vegetation revealed on TEE. We obtained these TEE images and transformed this data into a format compatible with stereolithography. The prints were done on a commercially-available 3D printer.

We demonstrate 3D physical stereolithographic objects that show the pathophysiology of an acute bacterial IE on this patient with a bicuspid aortic valve and a patent foramen ovale while simultaneously exploring the flow state characteristics that give rise to a tendency towards recurrence of this disease state.

Discussion:

Stereolithography can be used to render accurate and easily visualized models of cardiac pathology. Previous understanding of the pathophysiology of valvular vegetations has largely been limited to TEE, CT imaging, and biochemical studies of bacteremia. Despite this, mortality for IE continues to remain high, and risk of recurrence of IE in a patient's lifetime can be as high as 22%. We believe that the increasing use of stereolithographic methods for better understanding of valvular pathology will lend to improved outcomes in the management of patients with IE. We predict visualization of heart valves will increase patient understanding of their condition. 3-D printing of brain aneurysms has been used to determine the extent of surgical intervention needed in these cases.

This study demonstrates stereolithography is an effective modality for characterizing valvular pathology in IE. Further studies should aim to analyze how novel stereolithographic prints of endocarditis can optimize the decision to intervene surgically- by allowing the visualization of blood flow patterns, size of the vegetation and impact of said vegetation on surrounding structures.

Name: Rage Geringer, MD

Presentation Type: Oral Presentation

Residency Program: Sky Ridge Medical Center

Additional Authors: Roberto Lopez, DO; Dmitiri Scherbak, DO

Abstract Title: A Dedicated Medical Student Curriculum: Improving Internal Medicine Clerkship Performance

Abstract Information:

Medical education at HCA Health One Sky Ridge primarily hosts students from Rocky Vista University. Historically, students had no formal curriculum during their time at the HCA facilities. A curriculum was designed and implemented to focus on dedicated medical student didactics and inclusion of the students within the multidisciplinary team. After introducing the curriculum, medical students' internal medicine shelf exam scores have improved compared to the prior years. Overall student satisfaction with the HCA Health One rotations has also increased.

Case Description:

We provided the medical students with 2 days of didactics. The first on Monday afternoons for 90 minutes with a focus on oral case presentations. The second on Wednesdays where core internal medicine topics were covered each week, including cardiology, pulmonology, and gastroenterology. During Wednesday didactics, students would also work on physical exam skills by going to see patients with the teaching resident, who was chosen based on strong academic and clinical performance.

Students who rotated at our program have scored an average of 7.7 percentiles higher on the standardized NBME examination than the students from their school who did not rotate with us. Students rotating at our program have scored 3.3% higher in the first three months compared to all students last year. Satisfaction of the rotation is now 100% compared to 80% the previous year.

Discussion: The curriculum shows that a structured curriculum can improve overall academic performance in internal medicine clerkships. This initial research shows there is plenty of opportunity to further expand in this area of research, as there are no known research articles on this topic outside of ours. This includes a curriculum in other core clinical clerkships.

Name: Pedro Giro, MD **Presentation Type:** Oral Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors: Pratt-Cordova A BS, Coe GV MS, Ostertag M BS, Schulte M RN, O'gean K RN, Beindorff M RN, Byrd J RN, Pal JD MD, Cornwell WK 3 MD

Abstract Title: Longitudinal Study of Hemodynamic and Autonomic Response to Mechanical Circulatory Support Among Advanced Heart Failure Patients

Abstract Information:

Purpose: Determine the hemodynamic and autonomic response to implantation of durable continuous-flow (CF) left ventricular assist device (LVAD) among individuals with advanced heart failure (AHF).

Background: HF leads to neurohormonal activation with exaggerated increases in sympathetic tone. This hyperadrenergic environment is positively correlated with HF severity and mortality. CF-LVADs are an increasingly utilized strategy for treatment of AHF. These devices provide a non-physiologic pulse due to engineering characteristics. Previous investigations have demonstrated that this non-physiologic pulsatility contributes to marked increases in sympathetic tone through a baroreceptor-mediated reflex pathway. However, there are no data examining longitudinal changes in hemodynamics and/or sympathetic tone prior to and following device implantation.

Methods: Nine individuals (59 +/- 9 yrs, 8 males) scheduled for CF-LVAD implantation underwent hemodynamic assessment ~two weeks prior to, and ~three months following surgery. Heart rate (HR) and beat-by-beat blood pressure (BP) were continuously recorded by electrocardiogram and arterial-line, respectively on a commercially available bioinformatics platform at a frequency of 250Hz. Sympathetic tone was determined by assessment of plasma catecholamines. Individuals completed a graded head-up tilt (HUT) at supine, 30 and 60 degrees, with assessment of all parameters at each position.

Statistical Analysis: All statistical analyses were performed using SAS v 9.4. Linear mixed models with random effects were used to assess for differences in hemodynamic variables and plasma catecholamines during head-up tilt prior to and following CF-LVAD implantation. Mean and standard deviations are presented for descriptive statistics. A P value of less than 0.05 was used to establish statistical significance.

Results: HR during HUT was similar prior to and following CF-LVAD implantation. However, pulse pressure was significantly reduced following device implantation (50 ± 17 , 22 ± 10 , mmHg for pre- v, post-LVAD, respectively, group $P < 0.001$). Mean arterial pressure during HUT was similar between individuals pre- and post-LVAD (83.6 ± 13.6 v. 88.6 ± 14.1 mmHg, respectively, group $P = 0.260$). Despite the

reduction in pulsatility, plasma norepinephrine levels were significantly reduced following device implantation (pre-LVAD 710 ± 365 , post- LVAD 401 ± 200 pg/ml, group P < 0.001). Notably, pre-LVAD supine resting norepinephrine levels were significantly greater than post-LVAD levels at a 60-degree HUT (712 ± 374 v. 481 ± 234 pg/ml, P=0.015), indicating a marked reduction in autonomic tone following device implantation.

Discussion: Despite a reduction in physiologic pulsatility following CF-LVAD implantation, autonomic tone, as measured by plasma norepinephrine levels, significantly declines following device implantation. However, norepinephrine levels observed following device implantation are elevated compared to levels observed among healthy individuals. Together, this information suggests that CF-LVAD implantation reduces, but does not reverse, the hyperadrenergic environment that is characteristic of AHF. Efforts are underway to develop pumps that maintain physiologic pulsatility and whether this will fully reverse this hyperadrenergic environment remains unknown.

Name: Michael Harris, DO

Presentation Type: Oral Presentation

Residency Program: Parkview Medical Center

Additional Authors: Faisal Mahfooz, MD, Vincent Vaughn, DO, Jatinbhai Patel, MD, Hardik Doshi, MD, Teresa Braden, DO

Abstract Title: Hemiparesis in a Male with Anti-NMDA Receptor Encephalitis

Abstract Information:

Introduction: Anti-N-methyl-D-aspartate receptor (NMDAR) encephalitis is an autoimmune encephalitis first described in young women with prominent psychiatric symptoms, memory loss, and decreased level of consciousness. This was an unknown cause of encephalitis until about 2007, and now we know this accounts for a large portion of encephalitis cases. Disease progression is through antibody-mediated mechanisms with several studies showing that the loss of NMDARs is due to IgG-mediated internalization of these receptors throughout the brain. The differential diagnosis for encephalitis demands a thorough workup, including brain MRI, EEG, and CSF analysis. Here we describe a case of a 22-year-old male with hemiparesis and seizures that was diagnosed with anti-NMDA receptor encephalitis.

Case Description: A 22-year-old male presented to the hospital after a seizure at work around 8am. He developed symptoms of aphasia, left facial drooping, and left upper extremity weakness. One week prior to admission he had been in a motor vehicle accident. He initially presented to an outlying facility (OLF) where an MRV showed possible venous sinus thrombosis. The patient was transferred to our facility. While in the ER he had left arm weakness, and rapidly developed severe expressive aphasia. He then had another seizure, was intubated, and placed in the ICU. Follow-up CTV at our facility ruled out venous sinus thrombosis. Lumbar puncture and CSF analysis demonstrated elevated proteins (78.0 mg/dL), normal glucose (62 mg/dL), and slightly elevated white blood cell count (383 cells/uL) with lymphocyte predominance (55%). MRI of the brain showed T2 flair cortical hyperintensity in the right hemisphere. Neurology was consulted for seizures and recommended antiepileptic therapy along with a workup for viral causes. Infectious disease was consulted who started patient on empiric antibiotics including acyclovir. Subsequently, viral PCR for HSV I/ II, VZV, Enterovirus, and cryptococcus antigen from CSF were negative. Rapid testing for HIV was negative, as was bacterial culture from the CSF. In the absence of a unifying diagnosis, it was decided to repeat lumbar puncture. A paraneoplastic antibody panel from the repeat CSF sample was positive for the presence of anti-NMDA receptor antibodies. Workup for malignancies has been negative to date, and patient has made a full recovery after treatments with steroids and IVIG.

Discussion: This case demonstrates the severe and rapid progression of symptoms that can be seen with autoimmune encephalitis. This patient's presentation was atypical, being male in a disease presenting four times as common in women, and probably most atypical was the rapid development of hemiparesis. Studies show hemiparesis occurs in <5% of anti-NMDA receptor encephalitis adults >18 years of age. Autoimmune encephalitis remains an underdiagnosed condition despite studies showing that the prevalence and incidence is comparable to that of infectious encephalitis. Early diagnosis and treatment portend an overall improved prognosis.

Name: R. Kubowicz, MD

Presentation Type: Oral Presentation

Residency Program: Saint Joseph Hospital

Additional Authors: K. Kopel MD,

Abstract Title: Semicircular Canal Dehiscence Masquerading as a Psychiatric Disorder

Abstract Information:

Introduction: Anti-N-methyl-D-aspartate receptor (NMDAR) encephalitis is an autoimmune encephalitis first described in young women with prominent psychiatric symptoms, memory loss, and decreased level of consciousness. This was an unknown cause of encephalitis until about 2007, and now we know this accounts for a large portion of encephalitis cases. Disease progression is through antibody-mediated mechanisms with several studies showing that the loss of NMDARs is due to IgG-mediated internalization of these receptors throughout the brain. The differential diagnosis for encephalitis demands a thorough workup, including brain MRI, EEG, and CSF analysis. Here we describe a case of a 22-year-old male with hemiparesis and seizures that was diagnosed with anti-NMDA receptor encephalitis.

Case Description: A 22-year-old male presented to the hospital after a seizure at work around 8am. He developed symptoms of aphasia, left facial drooping, and left upper extremity weakness. One week prior to admission he had been in a motor vehicle accident. He initially presented to an outlying facility (OLF) where an MRV showed possible venous sinus thrombosis. The patient was transferred to our facility. While in the ER he had left arm weakness, and rapidly developed severe expressive aphasia. He then had another seizure, was intubated, and placed in the ICU. Follow-up CTV at our facility ruled out venous sinus thrombosis. Lumbar puncture and CSF analysis demonstrated elevated proteins (78.0 mg/dL), normal glucose (62 mg/dL), and slightly elevated white blood cell count (383 cells/uL) with lymphocyte predominance (55%). MRI of the brain showed T2 flair cortical hyperintensity in the right hemisphere. Neurology was consulted for seizures and recommended antiepileptic therapy along with a workup for viral causes. Infectious disease was consulted who started patient on empiric antibiotics including acyclovir. Subsequently, viral PCR for HSV I/ II, VZV, Enterovirus, and cryptococcus antigen from CSF were negative. Rapid testing for HIV was negative, as was bacterial culture from the CSF. In the absence of a unifying diagnosis, it was decided to repeat lumbar puncture. A paraneoplastic antibody panel from the repeat CSF sample was positive for the presence of anti-NMDA receptor antibodies. Workup for malignancies has been negative to date, and patient has made a full recovery after treatments with steroids and IVIG.

Discussion: This case demonstrates the severe and rapid progression of symptoms that can be seen with autoimmune encephalitis. This patient's presentation was atypical, being male in a disease presenting four times as common in women, and

probably most atypical was the rapid development of hemiparesis. Studies show hemiparesis occurs in <5% of anti-NMDA receptor encephalitis adults >18 years of age. Autoimmune encephalitis remains an underdiagnosed condition despite studies showing that the prevalence and incidence is comparable to that of infectious encephalitis. Early diagnosis and treatment portend an overall improved prognosis.

Name: Mehul Patel, MD

Presentation Type: Oral Presentation

Residency Program: Parkview Medical Center

Additional Authors: Marcel Juqueira, MD

Abstract Title: Post-gastric Bypass Hyperammonemic Encephalopathy, a Rare and Potentially Fatal Cause of Encephalopathy in the Intensive Care Unit

Abstract Information:

Introduction: In the US the prevalence of obesity has risen to 39.8% and affected about 93.3 million of US adults in 2015 (1). Morbidly obese patients are increasingly pursuing bariatric surgery as a highly effective therapy for obesity over the traditional therapies of diet and lifestyle modifications. While the benefits of bariatric surgery are numerous, it is important to recognize and understand the short term and long term postoperative complications. Hyperammonemic syndrome is an uncommon but severe complication of gastric bypass surgery. It is a rare cause of encephalopathy in the ICU setting and carries a high rate of mortality if unrecognized and treatment is delayed.

Case Description: A 43 year old woman with history of non-alcoholic fatty liver disease and history of prior gastric sleeve which was followed by Roux-en-Y Gastric Bypass (RYGB) surgery was admitted for shortness of breath and altered mental status. On hospital day number 10 patient was transferred to ICU for altered mental status, worsening hypoxia, retroperitoneal bleed and septic shock. Patient was subsequently intubated, given transfusions, placed on vasopressors, and given broad-spectrum antibiotics. After 72 hours her overall shock resolved and her ventilator requirements were minimal, but she remained in a comatose state. Initial workup including CT head and brain MRI were unremarkable. Initial routine EEG was consistent with low voltage delta frequencies which could be seen in the setting of severe encephalopathy. Ammonia level had risen to 169 umol/L, which was significantly elevated from prior level of 81 umol/L on admission (Table 1). Important to note that the patient had been on Lactulose and Rifaximin since admission and in spite of her having multiple bowel movements through her ICU course her ammonia level continued to rise and peaked at 244 umol/L. In addition to aggressive treatment with lactulose and rifaximin, multiple supplements were added, including: Zinc, multivitamin, and L-carnitine. Subsequent EEG on ICU revealed myoclonic status epilepticus for which antiepileptic drugs were given. Repeat MRI of the brain revealed increased diffusion-weighted signal intensity within the cortex and subcortical white matter of suggesting hypoxic and anoxic brain injury. Given the above findings patient was unlikely to have any meaningful neurologic recovery and family decided to pursue comfort care.

Hyperammonemic syndrome related to bariatric surgery is characterized by hyperammonemia, elevated plasma glutamine, hypoalbuminemia, reactive hypoglycemia, nutritional deficiencies of essential amino acids, and low zinc levels, in the absence of overt liver fibrosis or evidence of significant hepatocellular injury (2). The onset of hyperammonemic encephalopathy after RYGB surgery ranges from 1 month to 28 years (2). The mortality rate approaches 50% and it tends to occur at a high rate in women (2). Patients may present with irritability, vomiting, ataxia, mental retardation, lethargy, and eventually alteration in consciousness and coma (3). There are multiple genetic and nongenetic hypothesized mechanisms, including: X-linked partial OTC deficiency, malnutrition leading to protein catabolism, interference with citrulline synthesis in the intestinal

wall thereby leading to depletion of urea cycle components and diminished ureagenesis, alteration in gut microbiome favoring ureolytic strains that increase ammonia production, and nutritional changes result in hyperacetylation of the proximal urea cycle enzymes thus decreasing their activity (2). Treatment strategies for hyperammonemia include: lactulose, rifaximin, repletion of deficient amino acids, zinc, micro nutrients, and prevention of seizures and cerebral edema (3).

Discussion: It is important to consider hyperammonemia related to bypass as a potential etiology for neurologic changes in patients with prior bypass, especially in the ICU setting where multiple etiologies can cause encephalopathy and hyperammonemia.

References:

1. CDC: <https://www.cdc.gov/obesity/data/adult.html>
2. Fennes, A. et al. "Hyperammonemic Syndrome After Roux-En-Y Gastric Bypass." *Obesity Journal*. Volume 23. Number 4. 2015.
3. Krishnan P, Ramdas P, Landsberg. "Bariatric Surgery causing hyperammonemia." *Cureus* 11 (7): e5098. DOI 10.7759/cureus.5098. July 8, 2019.

Name: Matthew Rockstrom, MD Presentation Type: Oral Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors:

Abstract Title: High Volume Plasma Exchange in Acute Liver Failure Following Acetaminophen Toxicity: A Case Report

Abstract Information:

Case: A 21-year-old female was brought in by ambulance to the Denver Health emergency department after being found down after presumed suicide attempt. According to reports from the field, she ingested approximately 500 tablets of acetaminophen 500 mg as well as an unknown quantity of sertraline and dramamine. Upon arriving to the emergency department, she was obtunded and had lacerations around her neck. She was found to have lactic acidosis with an arterial pH of 7.00 and a lactate of 12.4, initially mildly elevated LFTs which would eventually peak at an AST of 1793 and ALT of 1542 on hospital day 2. Serum acetaminophen was greater than 600 mcg/mL, the maximum detectable quantity in the Denver Health lab. She met Kings Criterion for acute liver failure and was admitted to the medical intensive care unit. N-acetyl cysteine (NAC) was initiated, and she was placed on continuous veno-venous hemofiltration (CVVH) on hospital day 1. Unfortunately, due to the nature of her presentation and her long-standing mental health history, she was declined for liver transplantation. Given that she was not a candidate for transplant, she was placed on high volume plasma exchange (HVPE) on hospital day 1. HVPE was continued for a three day course. NAC and CVVH were continued for this time. Patient began to follow commands on hospital day 5 and was extubated. Conversant by hospital day 6. She was transferred from the ICU on hospital day 8 and discharged to inpatient psychiatry on hospital day 12.

Discussion: The morbidity and mortality associated with acute liver failure (ALF) have improved over the last three decades but there still remains a large associated mortality. A feared complication of ALF is multi-organ dysfunction (MOD). While the mechanism of MOD is yet unknown, it is theorized that hepatic necrosis and subsequent massive inflammatory response mediates this process. The mainstay of treatment remains liver transplantation if feasible but there remain a number of potential barriers to access to this therapeutic measure, as seen in this patient. The mainstay of therapy in non-surgical candidates remains treating the underlying cause if able, in this case the use of NAD, and supporting against MOD. There are a variety of measures by which MOD can be addressed, including CVVH and cerebral edema precautions used in this patient. HVPE, the process of exchanging patient plasma with fresh frozen plasma, serves as a means to address the inflammatory process by which MOD is mediated. In a randomized control trial of 182 patients, HVPE was shown to increase transplant free survival and decrease the incidence of SIRS and qSOFA. While this patient's care was multi-factorial, her severe nature and rapid recovery serve to support the efficacy of this therapy.

Name: Sarah Slaven, MD

Presentation Type: Oral Presentation

Residency Program: Parkview Medical Center

Additional Authors: Sarah Slaven, MD, Rajiv Patel, MD, Susan Nikels, MD

Abstract Title: A Stiff Body

Abstract Information:

Learning Objectives:

- Present an unusual case of subacute fatigue and stiffness
- Recognize the clinical features and pathogenesis of Stiff-Person Syndrome (SPS)
- Review the treatment options for Stiff-Person Syndrome

Case Description:

44-year-old male with a history of depression presents to his primary care physician with progressive fatigue, generalized morning stiffness and decreased exercise tolerance over several months. He was previously a very active person - exercising 1-2 hours per day. He was adopted and therefore family history unknown. Exam, including thorough neurologic exam, was unremarkable. Basic lab workup, head MRI and muscle biopsy were also negative, including LP with normal cell counts, negative OCB and negative Anti-GAD Ab. In his serum, however, both creatinine kinase and Anti-GAD Ab returned elevated. The compilation of clinical features and anti-GAD antibody suggested a diagnosis of Stiff-Person Syndrome (SPS).

Discussion: SPS is an uncommon neuromuscular disorder that is characterized by progressive rigidity and muscle spasm but can present insidiously with subacute fatigue and stiffness. Average age of presentation is 20-50 years, with women affected more often than men. The pathogenesis of SPS is thought to be through autoimmune targeting of gamma amino butyric acid neural pathways. Anti-glutamic acid decarboxylase (Anti-GAD) antibodies are present in 60-80% of patients with SPS. However, the role of Anti-GAD antibodies is yet to be fully elucidated. Several auto-immune conditions have been associated with SPS, including type 1 diabetes and thyroiditis.^{1,2}

There are three primary variants of SPS: classical, partial, and paraneoplastic. Classic SPS is most common (70-80%). These patients present with gradual truncal stiffness, proximal muscle rigidity, and increased startle reflex. There are no formal diagnostic criteria for SPS; diagnosis is based on clinical features and response to therapy. Notably, Anti-GAD Ab can be negative in about 40% of CSF studies that are positive in the serum.^{2,3}

Treatment of SPS is aimed at symptom control. First line therapy is benzodiazepines, titrating treatment to response. Second line options include baclofen with benzodiazepines or as monotherapy. If symptom management is insufficient, IVIG is another possibility. Finally, if refractory to IVIG, patients may benefit from B-cell

depletion with rituximab, plasmapheresis or immunosuppressive agents. Many patients with SPS can maintain normal function with therapy for extended periods of time; however, over time most become disabled.³

Conclusion: Stiff person syndrome is a rare neuromuscular disorder that is diagnosed primarily based on clinical features and response to therapy. As a primary care provider, one must maintain a high degree of suspicion based on patient history despite unremarkable test results and exam in order to initiate treatment in a timely fashion with the aim of delaying functional impact of disease.

Name: Leah Wells, MD **Presentation Type:** Oral Presentation
Residency Program: Saint Joseph Hospital

Additional Authors: Bree Smouse, MD

Abstract Title: Spikes Revenge: A Case of Rat Bite Fever

Abstract Information:

A 26-year-old male with ongoing homelessness and polysubstance abuse presents to our hospital with subjective fevers, myalgias, and skin changes. Three days prior, he noticed subtle red bumps on both surfaces of his hands, which quickly spread to involve his lower extremities. Shortly after, he developed diffuse aches that progressed into severe joint pain, making him unable to walk or use his hands without extreme discomfort. Physical exam on the day of presentation is notable for a well healing wound on the right index finger. With further probing, the patient reveals that this is the site that his pet rat Spike bit him, just a few days prior to symptom onset. Additionally, an erythematous papular rash with intermittent pustules is noted on the dorsal and palmar surfaces of his bilateral hands as well as extensor surface of his knees. Swelling and pain with movement of joints, particularly of the hands and knees, are also present. Laboratory values are normal, including negative testing for syphilis, HIV, Hepatitis B, Hepatitis C, Gonorrhea and Chlamydia. The infectious disease consult team feels that the patient's history and physical findings are overwhelmingly consistent with a rare disease, colloquially referred to as rat bite fever. Though blood cultures are pending (and will eventually be negative), the patient is assumed to have the disease based on high suspicion. He is started on ceftriaxone with rapid improvement in joint pain. Unfortunately, with his improvement, the patient insists on leaving against medical advice on the second day of antibiotic therapy. He is discharged with enough Keflex to complete a several week course.

In the United States, Rat Bite Fever is caused by *Streptobacillus moniliformis*-a bacterium in the upper respiratory tract of rats. Typically it is spread via biting, but can be passed to humans via any contact with saliva of an infected rat. Approximately a week after exposure, the patient develops fever, rigors, and myalgias, typically followed by polyarthralgias and rash. Of note, high clinical suspicion is necessary for diagnosis, since there are no reliable diagnostic tests. Even microbiological diagnosis is inaccurate as *S. moniliformis* is extremely fastidious, requiring microaerophilic conditions to grow. Thus, typical culturing methods will lead to a false negative, as in our patient. If recognized and appropriately treated with antibiotics, acute symptoms like rash and pain will often resolve within days. However, if the diagnosis is missed and the patient goes untreated, consequences are severe. The disease has a 10% untreated mortality rate. Additionally, even with the recommended 2 weeks antibiotic therapy (one week IV penicillin G, followed by 7 days oral penicillin), patients can experience long-term sequelae, including prolonged polyarthralgia, lasting up to years in some patients.

Name: Brett Ahlberg, DO **Presentation Type:** Poster Presentation

Residency Program: Sky Ridge Medical Center

Additional Authors: Paula J Watts, DO; Rachel Chung, DO; David Mohlman, DO

Abstract Title: Cerebellar Tonsils: The Low Hanging Fruit of a CSF leak

Abstract Information:

Introduction:

Spontaneous intracranial hypotension is caused by spontaneous cerebrospinal fluid leaks. It is seen in young to middle-aged adults and typically presents as orthostatic hypotension. We present a case of a 64 year-old-male with confusion and incontinence after a low-velocity motor vehicle accident.

Case Description:

A 64 year-old-male presented to our hospital with complaints of worsening confusion and incontinence. Prior to admission, he was discharged from an outside hospital where he presented after a low-velocity motor vehicle accident (MVA). He had been complaining of one to two weeks of positional headaches, with occasional nausea, prior to the MVA. A head CT was remarkable for a subacute appearing 10mm left subdural hematoma (SDH) and 5.5mm chronic appearing right SDH with bilateral uncal herniation. He underwent a craniotomy.

He presented to our hospital two days after discharge from the outside hospital with worsening confusion and episodes of urinary incontinence. His head CT revealed left and right SDH to 11mm and 9mm, respectively, with persistent bilateral uncal herniation. He underwent bilateral craniotomy. Post-operatively, he continued to have intermittent confusion, somnolence, with periods of obtundation. A brain MRI revealed persistent bilateral uncal herniation, low hanging cerebellar tonsils and a "sagging brain", suggestive of intracranial hypotension. MRI of his cervical, thoracic, and lumbar spine demonstrated a fluid leak at the cervicothoracic junction. He underwent two (2) myelogram-directed epidural blood patches at the area of concern with improvement in his symptoms.

Discussion:

Spontaneous intracranial hypotension (SIH) is caused by spontaneous cerebrospinal fluid (CSF) leaks. The etiology of spontaneous CSF leaks is unknown. The leading hypothesis at this time is due to structural weakness of the meninges, which can be associated with connective tissue disease. One third of spontaneous CSF leaks will have been provoked by minor trauma.

SIH usually presents as orthostatic headache since spontaneous CSF leaks itself do not cause symptoms. The headache is usually worse in an upright position and relieved by recumbency. The headache typically worsens within 15 minutes to

several hours of sitting or standing upright and resolves within 15 to 30 minutes of laying flat. It is a holocephalic, occipital, or suboccipital headache but can involve other focal areas of the brain. Other none-headache manifestations include cranial nerve abnormalities from traction, subdural hematomas, and venous sinus thromboses. It is associated with subdural fluid collections in 50% of patients. Diagnostic criteria include symptomatology, brain MRI, evidence of CSF leak, negative history of dural puncture, and headache duration. Management can include a conservative approach, epidural patch, percutaneous placement of fibrin sealant, or surgical repair.

Name: Matthew Applegate, MD **Presentation Type:** Poster Presentation

Residency Program: Saint Joseph Hospital

Additional Authors: Kopel, Katie, MD; Amiri, Yamah, MD; Coggins, Katy, MD; Quackenbush, Kevin, MD; Morton, Michael, MD

Abstract Title: Appropriate level of care for sepsis: “The Lactate Project”

Abstract Information:

Background: In an effort to decrease morbidity and mortality related to sepsis, hospitals have tried to find biomarkers to risk-stratify patients and other objective data to measure organ dysfunction leading to a high serum lactate (>4) as criteria for intensive care and aggressive resuscitation.

Methods: In this retrospective review, all patients admitted to a community hospital with a lactate ≥ 4.0 between March 2018 - August 2018 were reviewed. Each chart was reviewed for the cause of lactate elevation (sepsis v not sepsis), administration of 30cc/kg fluid bolus prior to admission, level of care at admission (floor v ICU), SIRS criteria, qSOFA criteria and signs of organ dysfunction (pressor support, respiratory failure, AKI, liver injury, mental status changes, MI/CHF). The study was not powered to determine statistical significance between groups.

Results: Of the charts reviewed, 126 patients were admitted with a lactate ≥ 4.0 . Of those, 77 (61%) were admitted to the ICU, 70 (55%) we thought to have sepsis, and 24 (19%) did not survive. Of the patients admitted with sepsis (55%), 74% were admitted to the ICU. In patients who survived, the average ICU length of stay was 2.2 days. In comparing overall survival, patients who did not survive had a larger proportion of reported AKI (92% v 52%), MI (16% v 4%), sepsis (71% v 50%), ventilatory support (75% v 16%), vasopressors (75% v 15%) and longer ICU stay (7.6 days v 2.2 days). When separated by qSOFA, the presence of AKI demonstrated a higher mortality (qSOFA 3+AKI 50% v qSOFA3 -AKI 0%; qSOFA 2+AKI 36% v qSOFA 3 -AKI 21%; qSOFA 1+AKI 17% v qSOFA 1 -AKI 0%; qSOFA 0+AKI 13% v qSOFA3 - AKI 0%;).

Conclusion: Among the patients who are admitted to the hospital with a lactate ≥ 4.0 , there should be a concern for organ dysfunction however, other criteria can be considered when determining the level of care. The presence of a qSOFA ≥ 2 with a lactate ≥ 4.0 would suggest increased mortality and should be considered for intensive care and close monitoring. In addition, the presence of an AKI and lactate ≥ 4.0 would also seem to show a difference in mortality and consideration for intensive care and close monitoring. Using the additional qSOFA scoring and AKI criteria may have prevented 9 ICU admissions with a potential cost savings of approximately \$35,000.

Name: Kristina Barber, MD

Presentation Type: Poster Presentation

Residency Program: Saint Joseph Hospital

Additional Authors:

Abstract Title: The Chicken or the Egg? A Case of Lemierre's Syndrome

Abstract Information:

Introduction:

Lemierre's Syndrome remains a rare diagnosis. The case presented here is a young female patient's prolonged course ultimately leading to a diagnosis of this obscure condition.

Case Description:

A previously healthy 22-year-old female grade school teacher presented to urgent care after a week of nausea, dry cough, fevers to 104°F, progressive dizziness and dyspnea, and one day of minor gum bleeding. She was tachycardic, tachypneic, hypotensive but not hypoxic or febrile. Workup revealed a leukocytosis, thrombocytopenia to 28, elevated D-dimer, extensive bilateral infiltrates on chest x-ray, elevated EBV IgM, and respiratory virus panel positive for coronavirus. She received 3 liters of IV fluids, ceftriaxone, and azithromycin then was transferred to the hospital.

In addition to septic shock, she had low grade DIC, requiring ICU admission for right internal jugular central line placement and circulatory support with norepinephrine. Antibiotics changed to vancomycin, zosyn, and azithromycin after CTA chest showed bilateral necrotizing pneumonia and bilateral loculated pleural effusions. She underwent bilateral thoracentesis and surgical chest tube placement. After intra-pleural administration of TPA and Dornase, she developed hemothorax requiring blood transfusion. Two additional chest tubes were placed without successful drainage. Ultimately, she underwent right sided VATS decortication. Her blood cultures had no growth, but her exudative pleural fluid cultures grew *Fusobacterium necrophorum*. Antibiotics changed to ertapenem, and bilateral neck doppler ultrasound demonstrated R IJ thrombophlebitis. Given the thrombus was found after the central line placement it was unclear if this was catheter associated versus Lemierre's Syndrome. Ultimately, she discharged to complete four additional weeks of ertapenem.

Discussion:

Lemierre's Syndrome or thrombophlebitis of the internal jugular vein characteristically implicates *Fusobacterium necrophorum* as the causative organism. Patients, usually in their second decade of life present with neck pain, fever, and sore throat. Translocation of oropharyngeal bacteria into the lateral pharyngeal space causes the thrombophlebitis which then embolizes. Like the question of which came first, the chicken or the egg, it was unclear in our patient if the IJ thrombus embolized to the lungs or if the pneumonia was separate from a

catheter associated thrombus. Lemierre's was favored once *Fusobacterium* were isolated from cultures. Reflecting on our patient, she had many characteristics of Lemierre's - EBV and coronavirus infection followed by IJ thrombophlebitis with pulmonary abscesses causing necrotizing pneumonia and bilateral empyemas with cultures growing *Fusobacterium*. Her course was particularly severe with septic shock, DIC, hemothorax, and ultimately need for VATS decortication. Earlier diagnosis of Lemierre's would not have changed the course of her illness or treatment; however, it may have provided clarity leading to comfort for the patient and her family. This case is a good reminder to make a broad differential diagnosis including obscure diagnoses as you never know when they will present.

Name: Christopher Caruso, MD **Presentation Type:** Poster Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors: Tyler Miller, MD; Rocky Mountain Regional Veterans Association Medical Center

Abstract Title: An Unusual Cause of a Miliary Chest-CT; Hypersensitivity Pneumonitis

Abstract Information:

Case Description: A 44 year-old female veteran with no relevant past medical history presented with acute shortness of breath, headache and hypoxemia. The patient had exertional symptoms for five days but otherwise her review of systems was negative. She had recently traveled via car to Arizona and southern California, which she visited frequently. She had pet dogs, rabbits, and parakeets at home. She was also actively remodeling her house, which was built in the 1960s. During her deployment she handled hazardous chemical supplies. On exam, she had a new two-liter oxygen requirement at rest but her lungs were clear to auscultation. Her white blood count was normal without a left shift or cell line abnormality. She underwent a chest CT that demonstrated a diffuse bilateral miliary pattern. During her hospitalization she underwent bronchoscopy with biopsy with normal pathology and bland bronchoalveolar lavage, bacterial and fungal cultures were also negative. She underwent a surgical lung biopsy and pathology demonstrated airway-centered organizing pneumonia, chronic inflammation and rare poorly formed granulomas, consistent with hypersensitivity pneumonitis (HP) and her outpatient providers recommended she give her birds away. Repeat imaging at 5 months showed improvement in her lung parenchyma.

Discussion: This patient presented with acute shortness of breath, which is a non-specific complaint with a vast differential diagnosis. Her only abnormal initial finding was a miliary pattern on her chest CT. The differential diagnosis for bilateral miliary infiltrates includes several entities to which this patient had exposure. Despite lack of exposure, tuberculosis was the most concerning diagnosis that had to be ruled out prior to bronchoscopy. The patient's frequent travel in the southwest United States made coccidiomycosis a possible diagnosis, but with negative fungal cultures in both bronchoscopy and wedge resection this diagnosis was eliminated. Rheumatologic causes of micronodules such as granulomatosis with polyangiitis and sarcoidosis were also considered, but without other systemic symptoms and lab abnormalities this became unlikely. Subacute HP infrequently presents in a miliary pattern as seen in this patient. Typically, HP has characteristic CT findings with bilateral ground-glass opacity and multiple ill-defined nodules <10mm. Bronchoalveolar lavage is the most sensitive test for HP and typically contains a

lymphocytic predominance greater than 20%, however, this is also a non-specific finding. Transbronchial biopsy for the diagnosis of HP only has a yield of 40% and therefore is often inadequate. When other methods of diagnosis fail, surgical lung biopsy can be used to differentiate HP from other interstitial pulmonary processes as it typically demonstrates poorly formed granulomas as seen in this patient.

Conclusion: In a patient with new onset of shortness of breath, a miliary pattern on chest CT, and multiple exposures, hypersensitivity pneumonitis should be considered.

Name: Michael Cerniglia, MD

Presentation Type: Poster Presentation

Residency Program: Saint Joseph Hospital

Additional Authors: Matthew Applegate, MD

Abstract Title: A Surprise Case of Gastrointestinal Schwannoma in Suspected GIST

Abstract Information:

Introduction: An often overlooked clinical consideration in the workup of submucosal tumors of the gastrointestinal tract are schwannomas. Given the relatively high incidence of gastrointestinal stromal tumors (GIST) and the challenge in making a preoperative diagnosis of GI schwannomas, it is important to keep this disease process on the differential to avoid a misdiagnosis. This is a rare case of a 43-year-old male who underwent distal gastrectomy with Roux-en-Y reconstruction for an uncontrolled GI bleed and found to have a gastrointestinal schwannoma.

Case Presentation: A 43-year-old male with no significant medical history presented to the ED with melena and hematemesis. On admission he reported low-grade fevers, nausea, headaches, and myalgia for the past few weeks due to mononucleosis and had been taking ibuprofen. A CT on admission showed a solid gastric antral mass suspicious for neoplasm and multifocal LN enlargement. An EGD revealed a large gastric submucosal mass with active bleeding that was unsuccessfully controlled with hemostatic spray. An embolization of the gastroepiploic artery was subsequently performed. However his hemoglobin continued to drop during hospital course and he required multiple blood transfusions. A second CT was done to localize the source of bleeding and showed a small focus of active bleeding along the left inferior portion of the tumor. He was taken emergently to the OR for distal gastrectomy with Roux-en-Y reconstruction. During the procedure a large firm distal gastric mass abutting the pylorus was identified as well as two enlarged palpable lymph nodes. At the time the mass was thought to be most likely GIST. However a biopsy was performed and the pathology report eventually revealed a schwannoma that demonstrated nuclear changes typical of so-called ancient change (which is benign and ultimately degenerative). On immunohistochemistry the mass was positive for S100. He progressed well during the remainder of his hospital course and was discharged in improved and stable condition.

Discussion: Schwannomas represent 2-6% of all mesenchymal tumors of the gastrointestinal system and can arise from any part of the GI tract but are most often seen in the stomach and colon. Most cases are found incidentally given the lack of pathognomonic findings and nonspecific symptoms (bleeding and abdominal pain). Preoperative diagnosis is challenging because endoscopic and imaging findings are equally nonspecific. Tissue histology is required for diagnosis with immunohistochemistry revealing the expression of S-100 protein and glial fibrillary acidic protein by these tumor cells. The main differential diagnosis in a discussion about GI tumors includes GIST as it is the most common GI mesenchymal tumor. Notably GIST cells do not express S-100 or GFAP proteins. However given the high relative incidence of GIST compared to GI-schwannomas, these tumors are often overlooked until a biopsy result. It is important to keep GI-schwannomas in mind when working up GI tumors as they carry a better prognosis for patients compared to GIST which has malignant potential.

Name: Michael Cerniglia, MD

Presentation Type: Poster Presentation

Residency Program: Saint Joseph Hospital

Additional Authors: Tyler Millard, MD

Abstract Title: A Case of Hypoglycemia induced Takotsubo Cardiomyopathy

Abstract Information:

Introduction: Takotsubo cardiomyopathy is defined as a transient and regional dysfunction of the left ventricle resulting in a ballooning of the apex in the absence of coronary artery disease. The pathogenesis of this disease is not completely understood. However a likely component includes sympathetic activity via catecholamine excess. Although there are only a few reports in the literature, hypoglycemia is considered one of the potential stressors inducing Takotsubo. This is a rare case of a 44- year-old female who presented after a syncopal episode with hypoglycemia and found to have Takotsubo cardiomyopathy.

Case Presentation: A 44-year-old female with a history of anorexia nervosa, bipolar disorder, and opioid use disorder presented to the ED after a syncopal episode. She was found down by her husband at home after an unknown length of time. He initiated CPR and called EMS. In the field she had low BP 50/30, hypothermia 31 C, and hypoglycemia with a BG in the 30s. She was given Narcan without response. Her mental status improved with glucose administration. On admission she reported having multiple falls and syncopal events recently and attributed these episodes to weakness in her legs. Cortisol and TSH were unremarkable for causes of hypotension. Given hypoglycemia and hypokalemia on admission it was initially felt that her presentation could be related to electrolyte derangements due to anorexia. However an echocardiogram revealed an EF of 30-35% with diffuse hypokinesis around the apex and inferior wall; findings consistent with Takotsubo cardiomyopathy. Her other admission labs revealed an elevated troponin that peaked at 7.02. During her stay she developed chest pressure and EKG changes with ST elevation in the anterior leads. However an emergent left heart catheterization revealed no coronary disease. Cardiology ultimately diagnosed her with Takotsubo cardiomyopathy and decided against medication management with ACE/ARB/BB in the context of patient's low blood pressure. Following discharge a repeat echocardiogram showed improved EF of 65-70% with resolution of the prior wall motion abnormalities.

Discussion: First described in Japan, the name "Takotsubo" means octopus trap and refers to the shape of a patient's heart (apex ballooning with a narrow base). This condition is most prevalent in older postmenopausal women and is often precipitated by a form of stress. Patients present with signs similar to ACS (chest pain or dyspnea) but can also present with syncope. The diagnosis is made via an echocardiogram revealing left ventricular systolic hypokinesis in the absence of coronary disease. Various pathophysiological mechanisms could explain this abnormal cardiac function and several have been postulated in the literature such as catecholamine excess or microvascular dysfunction. The stress related to metabolic disorders such as hypoglycemia has been purported to trigger this disorder. Therefore undiagnosed Takotsubo is possible among patients with severely low blood sugars. Since this condition can be fatal if left untreated, perhaps a lower threshold for imaging the heart of hypoglycemic patients is warranted.

Name: Ross Crandall, MD

Presentation Type: Poster Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors: Christopher Caruso, MD, Bryan Lublin, MD

Abstract Title: Diagnosis of Herpes Zoster Ophthalmicus in a Patient with Misdiagnosed Cluster Headache: A Case Report

Abstract Information:

Case: An 85-year-old man with squamous cell carcinoma of the tongue presented with one week of intractable headache. The headache came on gradually, and he first noticed it while moving hay on his property. The pain was right-sided, throbbing, orbital, radiating to the ipsilateral temple. He had photophobia and nausea but no vision changes. He had a remote history of migraines as a child. He had been to numerous emergency departments throughout the week, treated with migraine cocktail, intranasal lidocaine, high flow oxygen, valproic acid, dexamethasone, magnesium, morphine, ketorolac, metoclopramide, and crystalloid fluids, all without relief. The patient was uncomfortable yet conversational. The right sclera was injected with non-purulent tearing. Pupils were equal and reactive to light. Extra-ocular movements were intact with no pain or diplopia. Ocular pressures were normal. CBC, ESR, and CRP were normal. Brain MRI was negative for relevant intracranial, orbital, or sinus pathology. He was admitted to medicine for pain control. Given the above information, cluster headache was high on the differential, and he was re-trialed on high flow oxygen. Pain dramatically improved. He felt ready for discharge, but he agreed to stay overnight for symptom monitoring. The next morning, his headache returned, and erythematous non-vesicular papules were prominent along the right V1 trigeminal distribution of his face. Ophthalmology was consulted, and fluorescein stain showed a pseudodendritic pattern, confirming herpes zoster ophthalmicus (HZO). He was treated with valacyclovir, symptomatic eye drops, and close follow-up with ophthalmology.

Discussion: Headache is a common complaint treated by internists. When an atypical headache presentation fails to improve with standard treatments, it is essential to consider less common and potentially devastating conditions. Although this patient had several symptoms consistent with cluster headache, the namesake clustering feature was absent. By definition, the pain of cluster headache lasts 15 to 180 minutes, unlike the constant baseline pain of our patient.

Herpes Zoster Ophthalmicus is caused by infection of the ophthalmic division of the

fifth cranial nerve. In many cases, it affects the tip of the nose, which is called Hutchinson's sign, and this correlates highly with eye involvement. The diagnosis can be made clinically, but as in this case, the characteristic rash of HZO can often be delayed, leading to misdiagnosis of more benign conditions such as cluster headache. In cases where the diagnosis is less clear, additional studies such as PCR can be helpful. Early ophthalmology consultation for suspected HZO is important to clarify the diagnosis and initiate treatment. In this case, Ophthalmology was able to confirm the diagnosis on corneal exam with fluorescein stain. Treatment is critical to prevent or limit corneal involvement and potentially irreversible loss of vision.

Name: Spencer Grigg, DO

Presentation Type: Poster Presentation

Residency Program: Parkview Medical Center

Additional Authors: Ricki Kumar, DO; Douglas Duffee, MD,

Abstract Title: Where's Wellens - The Subtle ECG Finding That Matters

Abstract Information:

Introduction

The vast majority of physicians would be able to pick out an ST segment elevation myocardial infarction (STEMI) on 12 lead ECG. Most would likely be able to say that with elevation in leads V1, V2, V3, or V4 the patient is suffering from occlusion of the left anterior descending (LAD) artery. This case aims to highlight the subtle ECG findings that can be present with critical LAD stenosis and how this may differ from a typical STEMI in lead V1-V4 in both laboratory and physical presentation.

Case presentation

A 73-year-old male with past medical history of hypertension and asthma presented to the hospital complaining of progressively worsening burning and intermittent substernal chest pain over the past 3 weeks. He initially thought it was due to his acid reflux until he experienced associated radiation into his neck and jaw. He denied any other cardiac or pulmonary complaints on presentation. He has a significant smoking history but quit 6 years ago. Initial ECG was interpreted as T wave inversions in the lateral leads and initial troponin was 0.609 and trended up to 0.831. The patient was started on a heparin drip and admitted to the cardiology service for concern of non-ST elevation myocardial infarction (NSTEMI). Patient remained chest pain free overnight and was taken to the cardiac catheterization lab for selective coronary angiography the following morning. The patient was found to have 90-95% stenosis of the LAD with otherwise clean coronary arteries. The following echocardiogram revealed hypokinesis of the walls in the territory of the LAD.

Discussion

This patient presented to the emergency department with minimal and intermittent chest pain, minimally elevated troponins, and ECG changes that to the unfamiliar eye could be considered “nonspecific”. This case highlights how critical LAD stenosis can sometimes present subtly and that it is critical to promptly recognize and treat patients with Wellens Syndrome.

Name: William Grigg, DO

Presentation Type: Poster Presentation

Residency Program: Parkview Medical Center

Additional Authors: Bhavani Suryadevara, MD

Abstract Title: New Onset Atrial Fibrillation with Rapid Ventricular Response or NSTEMI- Which Came First?

Abstract Information:

Introduction: In clinical practice Atrial Fibrillation (AF) is the most common encountered arrhythmia and according to the Centers for Disease Control and Prevention (CDC) it is estimated to effect between 2.7 and 6.1 million people annually in the United States. The most recent data from the American Heart Association suggest that roughly 550,000 patients (roughly 70% of all types of Acute Coronary Syndrome) a year will suffer from Non-ST-Elevation Myocardial Infarction (NSTEMI). This case highlights that while these two processes can be independent of one another, certain types of myocardial ischemia can cause acute onset arrhythmia and in our patient specifically Atrial Fibrillation.

Case Description: A 67-year-old male with past medical history of ST Elevation Myocardial Infarction in 2009 w/ 2 stents to the Right Coronary Artery (RCA) and remote history of laryngeal cancer s/p laryngectomy presented to the emergency department with sudden onset chest pain and later developed palpitations. He reports the chest pain comes and goes, does not feel like his previous MI, and feels more dull than painful. He reports that more bothersome than the intermittent chest pain is the palpitations. He finds them uncomfortable and unnerving as he has never had palpitations before. In the ED the patient was noted to have normal vital signs except for an elevated heart rate on first nurse contact at 109 bpm. Initial EKG revealed Afib w/ RVR and repolarization abnormalities. Pt was started on diltiazem drip and initial troponin was 0.432 (Reference Range <0.056 is considered normal). The remainder of the patient's labs were within normal limits but given the patients history of CAD and minimally elevated troponin he was admitted overnight to the cardiology service. The patient was started on heparin drip, continued diltiazem drip, serial EKGs were ordered, and serial troponins were ordered. On high sensitivity troponins his lab values rose dramatically from 2045.8, 3849.3, 7561.0, and 8606.5. Given his elevation in troponin and new onset atrial fibrillation an echocardiogram was ordered, and he was taken to the Cardiac Cath Lab for selective coronary angiography. The cardiac cath revealed patency of his previous

stents to the RCA, 80% proximal disease to the first diagonal branch, and 95% disease to the left circumflex (LCX). Given the patient's new onset afib the LCX was stented with a drug-eluting stent. The patient's echocardiogram revealed normal wall motion with normal ejection fraction and no valvular abnormalities. Just minutes before the patient could be taken for cath he was found to have self-converted into normal sinus rhythm (NSR) on tele and confirmed on EKG. He remained in NSR during the cardiac cath and given the LCX lesion it is believed that this patient likely had ischemia induced atrial fibrillation and thus given the cardiac intervention does not need further rate/rhythm control medication and or anticoagulation.

Discussion: This case illustrates that providers must always look for the underlying cause of patient's arrhythmia and while not always needed an ischemic workup may be indicated in patients with atrial fibrillation and known coronary artery disease. Also, this case raises the question for providers of when do we anticoagulate atrial fibrillation. If the most likely cause of atrial fibrillation has been fixed, does one still need anticoagulation?

Name: H. Karl Greenblatt, MD **Presentation Type:** Poster Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors: Amy Yu, MD

Abstract Title: A "Spic-Tacular" Clue: Cutaneous Follicular Spicules as a Presenting Sign of Multiple Myeloma

Abstract Information:

Introduction: Cutaneous paraneoplastic syndromes may accompany a variety of malignancies. In multiple myeloma (MM), however, skin manifestations are uncommon at any point in the disease course and are extremely rare as an initial presenting feature. Follicular spicules (FS) is a very rare cutaneous paraneoplastic syndrome which is highly suggestive of underlying MM. We present a case of follicular spicules as a key clue to a new diagnosis of MM.

Case Description: An 87-year-old female with no significant medical history presented with several months of progressive back pain and difficulty ambulating. Her family members had also noticed an evolving rash on her face, chest, and back. She had mild dyspnea but denied fevers, chills, unusual fatigue, or unintentional weight loss. On admission, she was mildly hypoxemic on room air but was afebrile with otherwise stable vital signs. Physical exam revealed numerous follicular and papular lesions, some resembling frost, covering both sides of the face, upper back, and chest (see accompanying image). Neurologic exam was significantly limited by pain. Spinal imaging revealed a severe compression fracture of L1-L2 without evidence of cord compression. Initial laboratory results revealed the following:

- Corrected serum calcium: 10.3 g/dL (reference range 8.6-10.3 g/dL)
- Hemoglobin: 10.5 g/dL (12.1-16.3 g/dL)
- Serum creatinine: 0.71 mg/dL (0.60-1.20 mg/dL)
- Serum total protein: 10.8 g/dL (6.4-8.9 g/dL)
- Serum albumin: 2.3 g/dL (3.5-5.7 g/dL)
- Serum paraprotein gap: 8.5 g/dL (<4 g/dL)

The dermatology team evaluated the patient and suspected a diagnosis of FS associated with MM. This was supported by skin biopsy findings of hair follicles plugged with keratin and eosinophilic material. Serum and urine protein electrophoresis revealed a monoclonal IgG-kappa spike. Skeletal survey was equivocal for the presence of other osteolytic lesions. Bone marrow biopsy was pursued, and flow cytometry revealed abnormal CD19-negative, CD45-positive, CD56-positive plasma cells with kappa light chain restriction. This confirmed the diagnosis of MM.

Discussion: FS is an extremely rare and distinctive cutaneous manifestation of MM, with approximately 10 total published case reports. Differential diagnosis is essentially limited to trichodysplasia spinulosa, which is seen exclusively in HIV-positive patients. Our patient presented with a vertebral compression fracture – a common pathology in older female patients with osteoporosis – and mild normocytic anemia. She had no hypercalcemia, renal failure, or definitive osteolytic lesions, and thus did not fulfill the classic diagnostic tetrad for MM. In contrast, her skin lesions were highly unusual and prompted immediate investigation for MM, which was ultimately the correct diagnosis. This case illustrates that occult malignancy should often be considered in the evaluation of new and unexplained skin lesions. A knowledge of cutaneous paraneoplastic syndromes is valuable to the general internist and may significantly impact diagnostic reasoning.

Name: Patrick Jenkins, MD

Presentation Type: Poster Presentation

Residency Program: Sky Ridge Medical Center

Additional Authors: Dmitriy Scherbak, DO

Abstract Title: LUNGS TOO INELASTIC TO EMPTY AND TOO WEAK TO FILL: A CASE REPORT OF AMYOTROPHIC LATERAL SCLEROSIS IN A PATIENT WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Abstract Information:

Introduction:

Amyotrophic Lateral Sclerosis (ALS) is a progressive demyelinating disease of upper and lower motor neurons predominantly affecting voluntary movement. It is most common from 55 to 75 years of age with a slight predominance in men and non-Hispanic Caucasians. Respiratory failure is the most common cause of death in ALS. Pulmonary function tests (PFTs) are used as prognostic and monitoring tools. We present a case of ALS found in a patient with Chronic Obstructive Pulmonary Disease (COPD) with weakness and abnormal PFTs.

Case Description:

A 79-year-old man with a history of COPD and failure to thrive presented to the hospital with decreased level of consciousness and respiratory failure. Prior to admission he had progressive weakness and dysphagia with a 30 pound weight loss. He was being evaluated for failure to thrive by his primary care doctor and gastroenterologist. The day prior to admission he was seen by his pulmonologist and started on home oxygen based on new hypoxia during a six minute walk test and nocturnal oximetry testing. PFTs done prior to admission were consistent with a mixed obstructive and restrictive pattern.

On admission, his mentation and respiratory function rapidly improved without requiring intubation and his acute decompensation was believed to be due to carbon dioxide narcosis. Physical exam was significant for upper and lower motor neuron signs including diffuse weakness, muscle atrophy, hyperreflexia and subtle fasciculation of the upper and lower extremities. Due to the above findings there was concern for neuro-muscular disease, in particular ALS, superimposed on underlying COPD as the cause of his progressive respiratory failure. He was discharged on a noninvasive ventilator to follow up with neurology for electromyography, which confirmed bulbar ALS.

Discussion:

The incidence of ALS is approximately 5,000 new cases per year in the United States. ALS can be classified as spinal or bulbar based on whether weakness initially affects limbs (spinal) or speech and swallowing (bulbar). Bulbar generally progresses to respiratory failure more rapidly. Diaphragmatic weakness causing respiratory insufficiency is a major cause of mortality. PFTs are used to track disease progress. Forced Expiratory Volume in 1 second (FEV1) and Forced Vital Capacity (FVC) decline in a restrictive pattern. FVC is the most commonly measured respiratory marker of disease progression. Total lung capacity is typically decreased, though it was increased in our patient due to underlying COPD. Maximal Inspiratory Pressure (MIP), Maximal Expiratory Pressure (MEP), Maximal Voluntary Ventilation (MVV) and Maximal Sniff Nasal Inspiratory Force (SNIF) test are measures of respiratory muscle function that can be useful in evaluation of the disease. This case demonstrates the use of pulmonary function testing and physical exam to identify the development of a rare cause of respiratory failure in the context of known COPD.

Name: Shabnam Khoie, DO

Presentation Type: Poster Presentation

Residency Program: Sky Ridge Medical Center

Additional Authors: Paula J Watts, DO; M. Elizabeth Hicks, MD

Abstract Title: The Gem of my heart: Gordon

Abstract Information:

Introduction:

The epidemiology of infective endocarditis (IE) has changed over time, now with *Staphylococcus aureus* as the most common causative agent, but historically was viridans group streptococci. We present a rare case of IE on a bicuspid aortic valve (BAV) from *Streptococcus gordonii* bacteremia.

Case Description:

A 65-year-old male, with a history significant for BAV and prior native valve IE, presented with reported recurrent bacteremia. His history of IE occurred 3 years prior after having grown Gemella species. His treatment course was complicated by septic brain emboli, for which he was offered an aortic valve replacement. He declined surgical intervention and opted for prolonged IV antibiotic treatment alone.

He presented to our hospital after blood cultures from an urgent care grew gram positive cocci in chains. A day prior to presenting to our hospital, he was seen at the urgent care for fevers, rigors, and night sweats for 4 weeks. Two weeks prior to the onset of his symptoms, he had his teeth cleaned but did not receive antibacterial prophylaxis.

Both outpatient and inpatient blood cultures grew *S. gordonii*. Transesophageal echocardiogram revealed new moderate regurgitation to his known BAV and a highly mobile vegetation measuring 7mm x 3mm. The patient declined valve surgery again, despite recommendations, and opted for prolonged IV antibiotic therapy.

Discussion:

Endocarditis is an inflammatory state of the endothelium that promotes thrombus formation and tissue damage to cardiac valves. Congenital BAV are intrinsically predisposed to IE.¹ Viridans streptococci consists of six major species, including *S.gordonii*. *S.gordonii* is normal oral flora, one of many microbes responsible for dental caries. It is normally of low virulence, except in those with valvular

abnormalities. *S. gordonii* is currently responsible for approximately 1.4% of all IE reported.

Since the epidemiology of IE in developed nations has changed dramatically in recent years, the American College of Cardiology (ACC) and the American Heart Association (AHA) have introduced the modified Duke Criteria, endorsed by the Infectious Disease Association of America. The modified criteria classifies IE diagnoses to definite, possible, and rejected IE. Both definite and possible IE categories consists of major and minor criteria, including predisposition for IE, echocardiogram findings, microbiologic evidence, and clinical exam findings. IE treatment must be aggressive. Three sets of blood cultures must be drawn an hour apart, preferably prior to initiation of antibiotics. Empiric antibiotics should target the most likely organism, taking acuity and prior valve replacement into account. An immediate echocardiogram should evaluate for vegetations or valvular dysfunction. Valvular replacement indications include heart failure, uncontrolled infection, and prevention of septic embolization. After completing treatment acute IE, although there is conflicting evidence, ACC and AHA encourage antibiotic prophylaxis preceding dental procedures for the prevention of IE.

Name: Shabnam Khoie, DO

Presentation Type: Poster Presentation

Residency Program: Sky Ridge Medical Center

Additional Authors: Gregory Schlessinger, MD; Dmitriy Scherbak, DO

Abstract Title: Insalt on Injury

Abstract Information:

Introduction:

Patient safety advisory boards have reported events of accidental infusion of intravenous (IV) sterile water (SW) when discussing risk-reduction strategies. Most events did not result in patient harm. There is only one published report about a patient who experienced a hemolytic reaction, acute kidney injury (AKI), and died after infusion of IV SW. We present a case of accidental IV infusion of SW as a rare cause of AKI.

Case Description:

A 35-year-old female, with no history of chronic kidney disease, hypertension (HTN), or autoimmune hemolysis, was admitted after an L3/L4 laminectomy for hyperkalemia. Intraoperatively, SW was accidentally infused instead of Lactated Ringer's. When IV SW was discontinued, her stat serum creatinine (SCr) was 1.21mg/dL.

Upon presentation after transfer, she was oliguric. Her SCr was 2.15mg/dL, total bilirubin was 3.5mg/dL, haptoglobin was < 8mg/dL, and lactate dehydrogenase was 644U/L. Poison control and nephrology were immediately consulted for AKI after IV infusion of SW.

Fraction of excreted sodium was consistent with intrinsic renal pathology. Urine macroscopy was not performed due to "dark brown" color interference, and her renal ultrasound was unremarkable.

The patient's SCr peaked on hospital day 5 at 8.20mg/dL, at which point, she began intermittent hemodialysis. On hospital day 6, approximately two hours after completion of dialysis, she began to seize and had respiratory arrest.

In the intensive care unit after intubation and sedation, her blood pressure was 236/118. Her pressures slowly responded to IV propofol and her seizure to IV levetiracetam. Stat head computerized tomography scan was unrevealing.

On hospital day 8, the patient was extubated with no acute neurological deficits. Electroencephalogram was unremarkable, but magnetic resonance imaging showed

patchy edema within bilateral frontal, parietal, and occipital lobes, consistent with posterior reversible encephalopathy syndrome (PRES).

Her renal function improved with antihypertensives, requiring no further dialysis. At discharge, hospital day 12, her SCr was 1.53mg/dL. Two days following discharge, her SCr was 1.26mg/dL and a month later, repeat brain MRI showed resolution of the patchy supratentorial abnormalities.

Discussion:

Red blood cells lyse in hypotonic solutions because of the creation of an osmotic gradient. Lysis leads to the release of heme proteins, which can cause AKI through /decreased renal perfusion, direct cytotoxicity, and intratubular cast formation. It's unclear how recovering from AKI may lead to PRES, but case reports have been documented associating recovering AKI with both HTN and PRES.

This case exemplifies a rare opportunity to observe the effects of IV SW infusion. Great care should be taken to avoid administration of IV SW, but should this inadvertently occur, supportive care and symptom management are the only known solutions.

Name: Andrea Kieffer, MD

Presentation Type: Poster Presentation

Residency Program: Sky Ridge Medical Center

Additional Authors: Paul Judiscak, DO; Rob Heineman, DO; Craig Murk, OMS-III; Dmitriy Scherbak, DO

Abstract Title: ANCA-Associated Vasculitis and Systemic Manifestations with Volatile Solvent Exposure

Abstract Information:

Introduction:

ANCA-associated vasculitides (AAV) are a group of immune-mediated disorders in which systemic tissue injury results from the interaction of an initiating inflammatory event and a subsequent highly specific immune response. This can result in widespread vascular damage to nearly any microvascular system in the body, most commonly the glomeruli, lungs and sinuses.

Case Description:

Our case is a 54-year-old male with history of nephrolithiasis and pericarditis who presented dyspneic, vomiting, and with prolonged headaches. He admits to using new volatile solvents (Methyl-ethyl-ketone) to dissolve countertops without respirator or gloves immediately prior to symptoms. Patient was tachycardic with faint crackles on exam. WBC of 12.5, Hgb of 10.5, potassium 5.7, CO2 of 15, creatinine 10.4, proteinuria and hematuria present. Emergent dialysis was initiated and acidosis was corrected. CT chest revealed upper lobe opacities and lymphadenopathy. Bronchoscopy showed no hemorrhage and lavage cultures grew normal flora. CT of the abdomen and pelvis revealed pneumatosis intestinalis of colon and inflammatory changes. Subsequent testing was positive for Anti-myeloperoxidase A, consistent with P-ANCA vasculitis. Renal biopsy revealed sclerosing and crescentic pauci-immune glomerulonephritis, light microscopy revealed 15/20 glomeruli globally sclerosed and the remaining glomeruli nearly completely sclerosed and fibrotic. Interestingly, an echocardiogram revealed moderate global hypokinesis with an estimated ejection fraction of 34%, which was greatly decreased from an echo seven months prior. This was consistent with a pANCA cardiomyopathy. Cardiac MRI not obtained because of impaired renal function. Treatment with high dose steroids and Rituximab was initiated.

Discussion:

The systemic reach of vasculitides is not limited to renal and pulmonary, as seen with this patient's new-onset gastrointestinal and cardiac abnormalities. Furthermore, this case illustrates noninfectious inhalation exposure as a possible inciting event for the development of ANCA. AAV incidence is 1.2 - 2.0 cases per 100,000 individuals]. Roughly 89% of cases occur in white adults with equal male/female distribution. In one study of 155 similar presenting patients at four months, 14 percent died, and 35 percent were alive but required dialysis; 51 percent did not require dialysis and had no evidence of active vasculitis. One other study showed that remission was induced in 57% of 96 patients with eGFR of ≤ 10 . Treatment follows an algorithm developed based on BVAS score which relies on signs of end-organ damage to make the first decision between using rituximab or cyclophosphamide. Studies have shown that rituximab is an effective alternative to cyclophosphamide for new diagnosis of AAV . Plasma exchange is recommended based on 3 indications: the need for dialysis or a serum creatinine of >4.0 mg/dL, positive anti-GBM auto-antibody, pulmonary hemorrhage. Rituximab regimen is 1 g initially followed 14 days later by another 1 g dose. Oral steroid therapy should occur concomitantly at specific doses.

Name: Jessica Koontz, MD

Presentation Type: Poster Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors: Patrick Autruong, Mark Simon MD, Jessica Camacho MD

Abstract Title: The Many Faces of Vitamin B12 Deficiency: An Intriguing Case Highlighting Broad Symptomatology and Treatment Course Expectations

Abstract Information:

Learning Objectives:

- Recognize the diverse presentations of vitamin B12 deficiency, including the rarer neurologic and hematologic manifestations
- Promptly diagnose and treat vitamin B12 deficiency in order to relieve reversible symptoms at the expected pace of improvement and avoid irreversible outcomes

Case Description: A 65 year-old female with a history of Grave's disease presented for "failure to thrive," accompanied by symptoms of poor oral intake, intermittent diarrhea, bleeding gums, altered sense of taste, and a 30-pound weight loss. Neurologically, she had experienced increasing falls, urinary and bowel incontinence, altered sleep pattern, and abnormal behavior. Physical exam demonstrated poor memory, impaired concentration, disorientation, akathisia. A complete blood count showed pancytopenia with WBC of 0.8×10^9 cells/L, hemoglobin of 5.4 g/dL, MCV of 121 fL, and platelets of 59×10^9 cells/L. She was neutropenic with an ANC of 196 cells/uL. The reticulocyte index was hypoproliferative. A peripheral blood smear showed segmented neutrophils, macrocytic anemia, and schistocytes. Hemolysis labs revealed LDH 682 U/L (high), haptoglobin <10 mg/dL, fibrinogen 92 mg/dL (low), d-dimer 2890 FEU (high), total bilirubin 3.9 mg/dL consistent with active hemolysis. Her vitamin B12 was 150 pg/mL (ref range 211-946 pg/mL), homocysteine was >50 umol/L, and MMA was high at 37.68 umol/L. She was treated with Vitamin B12 1000 mcg intramuscularly daily for nine days. On discharge, her CBC was much improved. Reticulocyte index was adequate. Neurologically, her abnormal movements were only rarely noted. She demonstrated orientation to person, place, time, and condition.

Discussion: Given vitamin B12's role in a wide array of reactions, clinical manifestations of deficiency affect many organ systems and are highly variable. The most common manifestations of B12 deficiency are macrocytic anemia, hypersegmented neutrophils, polyneuritis, and ataxia. Rarer manifestations include pancytopenia, optic neuritis, bowel and bladder incontinence, hemolytic anemia,

and thrombotic microangiopathy. Neuropsychiatric symptoms are highly variable. Abnormal movements are a rare manifestation and are seen more often in pediatric presentations. Early recognition of B12 deficiency is crucial for reversal of symptoms, especially the life-threatening hematologic manifestations which always resolve with repletion. Neurologic manifestations are less likely to reverse and residual neurological abnormalities persist in most cases. Prompt treatment yields better results as irreversible changes in the brain may occur if left untreated. Hematologic improvements are rapid with effective therapy re-establishing normal marrow hematopoiesis in 48 hours. Normalization of the CBC takes about 8 weeks. The timeline for neurologic improvement is more variable with maximum response at 6 months.

Name: Amy Li, MD

Presentation Type: Poster Presentation

Residency Program: University of Colorado School of Medicine

Additional Authors: Deepa Ramadurai, MD

Abstract Title: Nephrotic Syndrome as an Initial Presentation of Syphilis

Abstract Information:

Case Presentation: A previously healthy 31-year-old homeless man presented with worsening anasarca and fatigue of one-month's duration. He smoked methamphetamines but otherwise denied any intravenous drug use nor alcohol use. On examination, vitals were notable for a heart rate of 95 beats per minute, blood pressure of 148/88 mmHg, and oxygen saturation of 95% on room air. He had periorbital edema and 4+ bilateral pitting edema of his upper and lower extremities. Laboratory studies revealed a creatinine of 1.15 mg/dL with blood urea nitrogen of 20 mg/dL, total cholesterol of 232 mg/dL, and calculated LDL of 172 mg/dL. Urinalysis revealed 3+ protein, 1+ blood, 2-5 RBC/hpf, and 6-10 WBC/hpf. Twenty-four-hour urine collection revealed 5.2 g of proteinuria. Complements were low with C3 of 86 mg/dL and C4 <1 mg/dL. Serum protein electrophoresis and serum free light chains were normal. HIV, hepatitis B, and hepatitis C serologies were negative. Antinuclear antibodies (ANA) were present with a titer of 1:160 in a speckled pattern. Notably, anti-dsDNA and anti-phospholipase A2 antibodies were negative. Rapid plasma reagin (RPR) was positive with a 1:512 titer. Subsequent confirmatory testing for syphilis, including fluorescent treponemal antibody absorption (FTA-ABS) and enzyme immunoassay (EIA), were positive. Upon further questioning, the patient revealed a history of unprotected sexual intercourse with a male partner about six months prior to presentation. He declined a renal biopsy. Nevertheless, a presumptive diagnosis of membranous nephropathy secondary to active syphilis infection was made. He was treated with high-dose atorvastatin, furosemide, and three doses of intramuscular penicillin G divided over three weeks. He was closely followed in the sexually transmitted infection clinic and demonstrated marked improvement of his anasarca after his first dose of penicillin G.

Discussion: Nephrotic syndrome has a wide differential, distilled to primary and secondary causes. Nephrotic syndrome is a rare, but well-documented, presentation of secondary syphilis, most often manifesting as membranous nephropathy. Proteinuria may also be seen in tertiary syphilis. Due to the rarity of this condition, there is no reliable data on incidence or prevalence. Although uncommon, individuals with syphilis occasionally have positive ANA titers^{1,2} and hypocomplementemia³. In this case, there were no classic symptoms of syphilis (including painless genital ulcerations, rash) preceding the development of the nephrotic syndrome. The CDC reported a 13.3% increase in cases of all stages of

syphilis from 2017-2018 in the United States, the highest number of cases since 1991. As such, it is imperative to identify high-risk individuals, obtain a detailed sexual history, and screen appropriately, with subsequent confirmatory testing to accurately diagnose and treat active or latent syphilis. Nephrotic syndrome due to syphilis is most often treated as secondary disease but may be treated as tertiary disease.

Name: Logan Reimer, DO

Presentation Type: Poster Presentation

Residency Program: Parkview Medical Center

Additional Authors: Neil Patel, M.D.; Jatinbhai Patel, M.D

Abstract Title: MRSA Mycotic Aneurysm - A Rare Complication of PCI and Impella device

Abstract Information:

Introduction: A mycotic aneurysm is the local destruction of a vessel wall caused by an infection. An aneurysm can develop primarily as a direct result of the infection or secondarily by the worsening of a pre-existing aneurysm. The most common etiologies are by direct bacterial inoculation, bacterial seeding, or by the spread of a contiguous infection. The term mycotic aneurysm was coined by Osler when describing an aneurysm, he observed in endocarditis patients. The term mycotic is a misnomer associating it to fungal infections because the majority of cases are bacterial in cause. The most common pathogen is Staphylococcus species. There have been cases of bacteremia being caused by cardiac catheterization procedures, with septic complications such as mycotic aneurysms being exceedingly rare (.24%).

Case Description: We present a case of a 70-year-old male with a history of coronary and peripheral artery disease who underwent percutaneous coronary intervention with access via the left common femoral artery, with Impella support throughout the procedure. He went home after the procedure in stable condition, however, over the next week he began to develop episodes of fevers. His left groin was tender on palpation with visible ecchymosis. Ultrasound of the affected area revealed a thrombosed 3-4 cm pseudoaneurysm with a 3 mm neck in the left superficial femoral artery distal the common femoral bifurcation. Open repair, local debridement of infected subcutaneous tissue, evacuation of an abscess, and bypass from distal left external iliac to superficial femoral artery and profunda femoris arteries with bovine carotid graft was performed by vascular surgeon. Blood cultures and cultures from excised artery showed growth of MRSA. Patient was treated with IV daptomycin initially, followed by IV vancomycin to complete a six weeks course.

References

¹Bell CL, Ali AT, Brawley JG, et al. Arterial reconstruction of infected femoral artery pseudoaneurysms using superficial femoral-popliteal vein. Journal of the American College of Surgeons. 2005; 200(6):831-6. [pubmed]

²McCready RA, Bryant MA, Divilbiss JL, Chess BA, Chitwood RW, Paget DS. Arterial infections in the new millenium: an old problem revisited. Annals of vascular surgery. 2006; 20(5):590-5. [pubmed]

³Brossier J, Lesprit P, Marzelle J, Allaire E, Becquemin JP, Desgranges P. New bacteriological patterns in primary infected aorto-iliac aneurysms: a single-centre experience. European journal of vascular and endovascular surgery : the official journal of the European Society for Vascular Surgery. 2010; 40(5):582-8. [pubmed]

- ⁴Marques da Silva R, Caugant DA, Eribe ER, et al. Bacterial diversity in aortic aneurysms determined by 16S ribosomal RNA gene analysis. *Journal of vascular surgery*. 2006; 44(5):1055-60. [pubmed]
- ⁵Brown SL, Busuttill RW, Baker JD, Machleder HI, Moore WS, Barker WF. Bacteriologic and surgical determinants of survival in patients with mycotic aneurysms. *Journal of vascular surgery*. 1984; 1(4):541-7. [pubmed]
- ⁶Moneta GL, Taylor LM, Yeager RA, et al. Surgical treatment of infected aortic aneurysm. *American journal of surgery*. 1998; 175(5):396-9. [pubmed]
- ⁷Carvalho PM, Mota JD, Dias PG, da Mota AO, de Moura JJ. Mycotic aneurysm of the femoral artery complicating *Staphylococcus aureus* bacteremia: a case report. *Cases J*. 2009;2:9386. Published 2009 Dec 22. doi:10.1186/1757-1626-2-9386
- ⁸Samore MH, Wessolossky MA, Lewis SM, Shubrooks SJ, Karchmer AW. Frequency, risk factors, and outcome for bacteremia after percutaneous transluminal coronary angioplasty. *The American journal of cardiology*. 1997; 79(7):873-7. [pubmed]

Name: Logan Reimer, DO

Presentation Type: Poster Presentation

Residency Program: Parkview Medical Center

Additional Authors: Neil Patel, M.D.:Jatinbhai Patel, M.D

Abstract Title: Uncommon Cause of an Abdominal Wall Abscess: Parvimonas Micra

Abstract Information:

Abstract:

Parvimonas micra is an obligate anaerobe that is part of the normal oral flora. Infections outside the oral cavity are uncommon, but cases of meningitis, septic arthritis, spinal abscesses, and empyemas have been reported. Abdominal infections are rarer, one case in the UK described an abdominal abscess, and only one case of hepatic and hepatic capsule infection has been reported. We present a case of a 70-year-old male with a history of stage III adenocarcinoma status post right colectomy of two years, who presented with sharp, right-sided abdominal pain, chills, and night sweats. CT of the abdomen and pelvis revealed a large 7.6 x 7.6 x 3.6 cm lobulated peripherally enhancing mass in the right anterolateral abdominal wall invading the musculature and intraperitoneal fat, however, not invading the liver. There was a plane of fat with stranding adjacent to the mass interposed between it and the patient's anastomosis. There was no evidence of free air or free fluid in the abdomen. CT guided biopsy with 18-gauge needle was performed and pathology revealed marked acute and chronic inflammation, consistent with an abscess, and fluid contained gram-positive cocci singly, in pairs, and in clusters. Biopsy was negative for malignancy. 8 french abscess drain was placed by radiology to grenade bulb drainage. Patient was started on Ampicillin/Sulbactam. Three days later, patient showed remarkable improvement in his symptoms and he was switched to oral amoxicillin/clavulanate for discharge from the hospital. Initial gram stain from the purulent drainage showed few gram positive cocci in singles, pairs, and clusters. Three days after discharge, culture from the abscess showed growth of Parvimonas micra sensitive to amoxicillin/clavulanate, clindamycin, penicillin, and metronidazole.

¹ Uemura H, Hayakawa K, Shimada K, et al. Parvimonas micra as a causative organism of spondylodiscitis: a report of two cases and a literature review. International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases. 2014; 23:53-5. [pubmed]

² Gorospe L, Bermudez-Coronel-Prats I, Gomez-Barbosa CF, Olmedo-Garcia ME, Ruedas-Lopez A, Gomez del Olmo V. Parvimonas micra chest wall abscess following transthoracic lung needle biopsy. The Korean journal of internal medicine. 2014; 29(6):834-7. [pubmed]

³ Riesbeck K, Sanzén L. Destructive knee joint infection caused by Peptostreptococcus micros: importance of early microbiological diagnosis. Journal of clinical microbiology. 1999; 37(8):2737-9. [pubmed]

⁴ Ang MY, Dymock D, Tan JL, et al. Genome Sequence of Parvimonas micra Strain A293, Isolated from an Abdominal Abscess from a Patient in the United Kingdom. Genome announcements. 2013; 1(6):. [pubmed]

⁵ Chaucer, Benjamin et al. "Multiple Hepatic Abscess from Parvimonas micra: An Emerging Gastrointestinal Microbe." ACG case reports journal vol. 5 e70. 26 Sep. 2018, doi:10.14309/crj.2018.70

Name: Jessica Sels, DO

Presentation Type: Poster Presentation

Residency Program: Parkview Medical Center

Additional Authors: Vincent Vaughn PGY III, Stephanie Murphy D.O.

Abstract Title: Orange you glad you don't have scurvy? A case of scurvy caused by poor dietary intake in a developmentally delayed 57 year old female

Abstract Information:

Introduction: A 57 year old female with a past medical history of rheumatoid arthritis, pyoderma gangrenosum, and developmental delay presented complaining of joint pain.

Case Description: She was incidentally found to have multiple superficial skin lesions without purulent drainage, foul smell, or other signs of infection on her entire body including her genital region, face and scalp. Previous providers noted the lesions were chronic and were attributed to poor hygiene and skin picking. The patient reported spending the majority of time in bed and relying on her family for care. She was unable to obtain food for herself leading to a lack of fruits and vegetables. She had an unremarkable nutrition workup for her skin lesions except a vitamin c level of <0.1 mg/dL, supportive of scurvy.³ Initially, she was started on 1000 mg of ascorbic acid daily. Pt was admitted to the hospital 3 months later, and, at that admission, her skin ulcerations had nearly completely resolved.

Discussion: Scurvy can appear within 1 month of vitamin C intake below 10 mg/day, depending on the body stores⁵. This case represents the need to include rare nutritional deficiencies in differentials in those deemed to be at high-risk.

Sources:

1. Johnson, L. (2018) Vitamin C. Merck Manual. Retrieved July 25, 2019 from <https://www.merckmanuals.com/professional/nutritional-disorders/vitamin-deficiency,-dependency,-and-toxicity/vitamin-c>
2. Leger, D. (2008). Scurvy: Reemergence of Nutritional Deficiencies. Can Fam Physician. 1403–1406. Retrieved on 7/25/2019 from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2567249/>
3. Pazirandeh, S, and Burns, D (2019). Overview of water-soluble vitamins. A.G. Hoppin (Ed.), UpToDate. Retrieved July 25, 2019, from https://www-uptodate-com.proxy.rvu.edu/contents/overview-of-water-soluble-vitamins?search=scurvy§ionRank=1&usage_type=default&anchor=H54&source=machineLearning&selectedTitle=1~50&display_rank=1#H54
4. Saadia, T Et al. (2017). Topsy-Turvy over Scurvy: Vitamin C Deficiency Masquerading as lupus erythematosus in a 20-year-old-Female.

5. "Vitamin C." *National Institutes of Health Office of Dietary Supplements*, 18 Sept. 2018, ods.od.nih.gov/factsheets/VitaminC-HealthProfessional/.

Name: Leah Wells, MD

Presentation Type: Poster Presentation

Residency Program: Saint Joseph Hospital

Additional Authors: T. Shah

Abstract Title: CONTRAST-INDUCED SIALADENITIS: A BENIGN REACTION

Abstract Information:

Introduction: Contrast-Induced Sialadenitis or “Iodine mumps” is a rare reaction typically characterized by bilateral submandibular swelling. Clinical symptoms develop minutes to days following exposure to IV or oral iodinated contrast agents. This reaction does not directly involve the airway, and no deaths or long-term sequelae have been documented in the literature, making the use of anti-inflammatory agents, such as steroids, controversial. On average, neck swelling resolves within four days of onset. However, recurrence with future exposures to iodine has been reported. In this report we present a case of a woman quickly developing submandibular swelling following contrast administration.

Case Report: A 67 year-old female, with past medical history of stage IIIB adenocarcinoma of lung, presented with acute onset of shortness of breath. Her initial exam was notable for normal head and neck exam and she was at her baseline oxygen need. She underwent evaluation with pulmonary computed tomography angiography, which was negative for pulmonary embolism. Soon after, her shortness of breath resolved. Twelve hours following the scan, the patient developed bilateral submandibular swelling without any oral or perioral swelling and no evidence of airway compromise. A presumed diagnosis of contrast-induced sialadenitis was made. She had received diphenhydramine without improvement, but was observed without further pharmacological intervention. Her swelling began to decrease around 24 hours later and completely resolved within 48 hours.

Discussion:

The exact pathophysiology of iodide mumps is not fully known but is thought to be an inflammatory reaction due to iodine accumulation in the salivary glands. The diagnosis of contrast-induced sialadenitis can be made clinically, as with our patient, however, ultrasonography is helpful for difficult diagnoses. Ultrasonography of patients with iodine mumps can reveal dilated ducts, despite lack of stones or obvious obstruction. Additionally, peripheral fluid accumulation and central hyperemia is often noted. Of note, these ultrasound changes resolve as the patient improves clinically. This pattern indicates that accumulation of

iodine within the ducts is an important predisposing factor to the reaction. The accumulated iodine then leads to an inflammatory reaction, leading to fluid collection and increased blood flow into the glands.

Prompt diagnosis of this reaction and awareness of its resolution with supportive care in our patient can prevent unnecessary workup and treatment in similar cases. Additionally, due to the benign nature of the reaction, it is important to remember that patients like ours with a history of contrast-induced sialadenitis can be given iodine-containing products in the future, when it is indicated. Premedication with steroids and antihistamines is unnecessary in these instances, as it has not been proven to decrease incidence or severity of recurrent reaction.